



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

**(51) International Patent Classification <sup>7</sup> :**

A61F 13/15

## A1

**(11) International Publication Number:**

**WO 00/53140**

**(43) International Publication Date:** 14 September 2000 (14.09.00)

**(21) International Application Number:** PCT/JP00/01368

**(22) International Filing Date:** 7 March 2000 (07.03.00)

**(30) Priority Data:**

11/63345	10 March 1999 (10.03.99)	JP
11/348995	8 December 1999 (08.12.99)	JP

(71) Applicant (for all designated States except US): KAO CORPORATION [JP/JP]; 14-10, Nihonbashi Kayaba-cho 1-chome, Chuo-ku, Tokyo 103-0025 (JP).

**(72) Inventors; and**

(75) **Inventors/Applicants (for US only):** OKUDA, Yasuyuki [JP/JP]; Kao Corporation, Research Laboratories, 2606, Akabane, Ichikai-machi, Haga-gun, Tochigi 321-3426 (JP). WATANABE, Hisanori [JP/JP]; Kao Corporation, Research Laboratories, 2606, Akabane, Ichikai-machi, Haga-gun, Tochigi 321-3426 (JP). ITO, Hidekazu [JP/JP]; Kao Corporation, Research Laboratories, 2606, Akabane, Ichikai-machi, Haga-gun, Tochigi 321-3426 (JP). KOYAMA, Takao [JP/JP]; Kao Corporation, Research Laboratories, 2606, Akabane, Ichikai-machi, Haga-gun, Tochigi 321-3426 (JP).

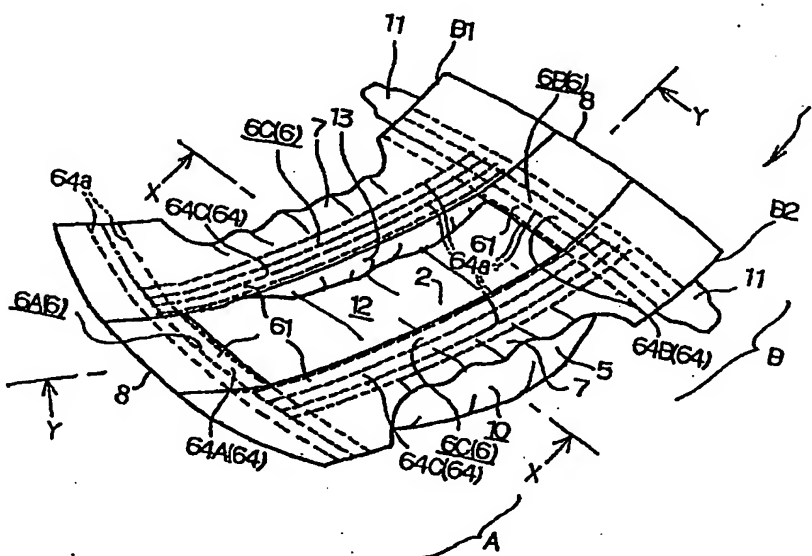
(74) Agents: HATORI, Osamu et al.; Akasaka HKN Building 6F, 8-6, Akasaka 1-chome, Minato-ku, Tokyo 107-0052 (JP).

(81) Designated States: CN, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

**Published**

**With international search report.**

(54) Title: ABSORBENT ARTICLE



**(57) Abstract**

An absorbent article includes a liquid-permeable topsheet (2), a liquid-impermeable antileakage sheet (3), a liquid-retentive absorbent core (4), having a substantially elongate shape, and having upstanding guards (6) formed on longitudinal left and right opposing side portions of the absorbent article, the upstanding guards (6) are provided with a plurality of upstanding guard elastic members (64) (64a, 64b, 64c, 64d) so as to form a gather over the entire region in the widthwise direction of the upstanding guard (6), the upstanding guard (6) is sectioned into a free end region (65), a central region (66) and a basal end region (67) so as to trisect it in its widthwise direction, and stress of the free end region (65) is larger than that of the other regions (66 and 67).

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

## DESCRIPTION

## ABSORBENT ARTICLE

## Technical Field

5 The present invention relates to an absorbent article which exhibits excellent antileakage properties and also gives excellent feel during use.

## Background Art

10 Various kinds of absorbent articles have been proposed, such as disposable diapers in a substantially elongate shape, including a liquid-permeable topsheet, a liquid-impermeable antileakage sheet, a liquid-retentive absorbent core, and having an upstanding guard formed on longitudinal left and right opposing side portions of the diaper.

In such a conventional upstanding guard, a strip of elastic member is disposed on the distal end side and rises upwardly of the diaper. However, this structure has not succeeded in sufficiently standing the guard during use, thus failing to give a desired leakage prevention effect.

15 USP 5,643,243 has proposed to arrange a plurality of elastic members to the upstanding guard, but the conventional upstanding guards having a plurality of elastic members do not closely fitted to the wearer's skin, failing to attain sufficient leakage prevention properties.

## Disclosure of the Invention

20 It is, therefore, an object of the present invention to provide an absorbent article such as a disposable diaper in which an upstanding guard exhibits a good fit to the wearer's skin, and the leakage prevention properties are improved.

25 The present invention has achieved the above object by providing an absorbent article including a liquid-permeable topsheet, a liquid-impermeable antileakage sheet and a liquid-retentive absorbent core, having a substantially elongate shape, and being provided

with upstanding guards on the longitudinal left and right opposing side portions of the absorbent article, wherein the upstanding guards are provided with a plurality of upstanding guard elastic members so as to form a gather over the entire region in the widthwise direction of the upstanding guard, and wherein the upstanding guard is  
5 sectioned into a free end region, a central region and a basal end region so as to trisect it in the widthwise direction, the stress of the free end region being larger than that of the other regions.

### Brief Description of the Drawings

10 The present invention will now be described with reference to the following drawings, wherein

Fig. 1 is a developed plan view showing a disposable diaper as a first embodiment of the absorbent article of the present invention in which elastic members are in a stretched condition;

15 Fig. 2 is an enlarged plan view of the X portion shown in Fig. 1;

Fig. 3. is a partially enlarged plan view showing a disposable diaper as a second embodiment of the absorbent article of the present invention corresponding to Fig. 2;

Fig. 4 is a perspective view showing the topsheet side of a disposable diaper according to a third embodiment of the present invention which is in a free (or relaxed)  
20 condition;

Fig. 5 is a sectional view taken along line X-X of Fig. 4 in which elastic members are in a stretched condition;

Fig. 6 is a perspective view of a disposable diaper according to a fourth embodiment of the present invention viewed from the topsheet side of a disposable diaper  
25 in a free (or relaxed) condition;

Fig. 7 is a sectional view taken along line X-X of Fig. 6;

Fig. 8 is a sectional view taken along line Y-Y of Fig. 6; and

Fig. 9 is schematic view showing the apparatus used for the water-proof test.

### 30 The Best Mode for Carrying out the Invention

A disposable diaper of the first embodiment of the present invention, will now be described. The disposable diaper 1 as the absorbent article according to the present invention, as shown in Figs. 1 and 2, includes a liquid-permeable topsheet 2, a liquid-

impermeable antileakage sheet 3, and a liquid-retentive absorbent core 4, having a substantially elongate shape, and being provided with upstanding guards 6 provided on the longitudinal left and right opposing side portions of the diaper.

5 The disposable diaper 1 of this embodiment is arranged in such a manner that the topsheet 2 and the antileakage sheet 3 sandwich and fix the absorbent core 4. Left and right opposing side portions B1, B2 of the back side portion B are each provided with a fastening tape 11.

10 The top surface of the antileakage sheet 3 is provided with an outer layer nonwoven fabric 5. The outer layer nonwoven fabric 5 extends such that the opposing side edges thereof locate outwardly of the side edges 4a of the absorbent core 4. The extended portion of the outer layer nonwoven fabric 5 is sealed to a sheet material 61 for forming the upstanding guard to thereby form a pair of left and right side flap portions 7. The sheet material 61 adheres to the topsheet 2 in the upper position of the absorbent core 4 to thereby form a basal end 60.

15 The disposable diaper 1 of this embodiment is provided with four upstanding guard elastic members 64 (64a, 64b, 64c, 64d) in the upstanding guard 6 so that a gather is formed in the upstanding guard 6 over the entire region in the widthwise direction thereof. When the upstanding guard 6 is sectioned into a free end region 65, a central region 66 and a basal end region 67 so as to trisect it in the widthwise direction, the stress of the free end  
20 region 65 is larger than that of the other regions 66 and 67.

If the stress of the central region 66 is larger than that of the free end region 65, the central region 66 reduces its function as a buffer region for buffering outer factors, failing to ensure the stability of the free end region 65 during wear.

25 If the stress of the basal end region 67 is larger than the free end region 65, the basal end region 67, which should be a support region, also has an effect as a fit region and is likely to move to the groin, failing to maintain the upstanding guard in a stable shape.

In more detail, in this embodiment, the upstanding guard elastic members 64a, 64b, 64c, 64d each are in a string form and are disposed linearly along the longitudinal direction of the disposal diaper 1 and in parallel with each other.

30 As shown in Fig. 2, elastic members 64a, 64b, 64c, 64d are arranged so as to have an unequal interval between the adjacent members. The free end region 65 has two elastic members of the third and fourth elastic members 64c, 64d, the central region 66 has one

elastic member of the second elastic member 64b, and the basal end region 67 has one elastic member of the first elastic member 64a.

5 The first, second, third and fourth elastic members of 64a, 64b, 64c, 64d in this embodiment are made of the same members at the same stretching ratio, so that each elastic member has the same stress. Thus, the central region 66 and the basal end region 67 each provided with only one elastic member has smaller stress than the free end region 65 provided with two elastic members, which constitution imparts the highly fit properties and antileakage properties to the diaper.

10 Specifically, the elastic members 64a, 64b, 64c, 64d each preferably have a stress of 5 to 50 cN from the viewpoint of close fit to the wearer.

The stress of the free end region 65 is preferably 10 to 100cN, more preferably 10 to 80 cN, from the viewpoint of exhibiting fit and antileakage properties in a high level and a softening touch to the skin.

15 The stress of the central region 66 is preferably 5 to 80 cN, more preferably 5 to 60 cN, from the viewpoint of ensuring the stability of the free end region (fit region) during use by allowing the central region to function as a buffer region for buffering the deformation of the diaper body or forces caused by movements of the wearer.

20 The stress of the basal end region 67 is preferably 5 to 90 cN, more preferably 5 to 70 cN, from the viewpoint of exhibiting highly fit properties and preventing an excessively strong touch to the skin by allowing the basal end region 67 to reliably receive forces by movements of the wearer.

25 The difference between the stress of the free end region 65 and the basal end region 67 or the central region 66 in a 50% stretched condition is preferably 5 cN or more, more preferably 10 cN or more, most preferably 10 to 50 cN, from the viewpoint of exhibiting the advantageous effects of each region, highly fit properties to the skin and good standing properties of the upstanding guard.

The stress of each elastic member and the stress of each region in the present invention can be measured in the following manner.

30 Stress of the Elastic Member; If the elastic member which has not been applied to an upstanding guard is available, the following measuring method is applicable thereto as it is. If it has been applied to an upstanding guard, the elastic member is removed from the upstanding guard and subjected to the following measuring method. If the the elastic

member is fixed by an adhesive or the like, the separation is preferably done by subjecting it to heat with a drier or the like to the extent that the physical property is not modified.

#### < Measuring Method >

5 A sample of an elastic member was subjected to a tensile test under the conditions of 100 mm in preliminary chuck distance and 300 mm/min in crosshead moving rate using a Tensilon tensile tester (manufactured by Orientic Corp.) to stretch the sample up to 100 % and measure S-S curve line. The weight at a point of 50% stretching was measured as the stress of the elastic member.

10 Stress of Region; An upstanding guard of each region having a length dimension of 140 mm was cut out. The upstanding guard means the portion between the basal end to the free end. Each region can be cut out by trisecting the region from the basal end to the free end. The measuring method applied to the elastic member was repeated to measure the weight at a point of 50% stretching with respect to each region as the stress of the region. If the fixed elastic member is not in a 100 % stretched condition, then the elastic member should  
15 be stretched so as to reach its maximum stretching magnification, followed by measuring of its S-S curve line. The weight at a point of 50 % stretching was measured as the stress.

The following measures are taken in the case that the region cannot be measured independently because of the presence of an elastic member in the boundary portion of each region or for another reason.

20 1. In the case that the width of the elastic member is smaller than one third of the width of each region:

a) If an elastic member exists on the boundary line between the free end region and the central region, it is treated as the elastic member of the free end region.

25 b) If an elastic member exists on the boundary line between the central region and the basal end region, it is treated as the elastic member of the basal end region.

2. In the case that the width of the elastic member is larger than one third of the width of each region, including the case that a string elastic member curves across each region and the width of the portion provided with the string elastic member is larger than one third of the width of the region:

30 After measuring the stress of each region excluding the elastic member of the boundary portion and the stress of the elastic member in the boundary portion, the latter stress thus measured is added to the former stress in a proportion of the existing ratio of

the elastic member occupied in each region to thereby obtain the stress of each region.

For example, if the stress of the free end region excluding the elastic member of the boundary portion is 30 cN and that of the central region excluding the elastic member of the boundary portion is 10 cN, the stress of the elastic member of the boundary portion is 20 cN, the existing ratio of the elastic member at the free end region is 0.7 and that in the central region is 0.3, then the stress of the free end region is  $30 + 20 \times 0.7 = 44$  cN, and the stress of the central region is  $10 + 20 \times 0.3 = 16$  cN.

The existing ratio can be determined from the area ratio of the elastic member in the region. If the elastic member is disposed in generally parallel with the region boundary portion, the ratio of the width occupied in each region can be the existing ratio. The "width of the elastic member" referred to here is the width in the case that the elastic member is disposed in the predetermined position of the upstanding guard of the absorbent article which is in a maximally expanded condition, i.e., in an developed condition of an absorbent article in an expanded manner as shown in Fig. 1. The same should be applied to the existing ratio.

Among four upstanding guard elastic members 64a, 64b, 64c, 64d, the interval between the upstanding guard elastic member 64a (referred to as the "first elastic member" hereinafter) arranged in the most basal end 60 side and the upstanding guard elastic member 64b (referred to as the "second elastic member" hereinafter) arranged in the second from the basal end 60 is defined as  $t_1$  (referred to as the "first interval" hereinafter), and the interval between the upstanding guard elastic member 64c (referred to as the "third elastic member" hereinafter) arranged in the second from the free edge end 63 and the second elastic member 64b is defined as  $t_2$  (referred to as the "second interval" hereinafter), and the interval between the upstanding guard elastic member 64d (referred to as the "fourth elastic member" hereinafter) arranged in the free edge end 63 and the third elastic member 64c is defined as  $t_3$  (referred to as the "third interval" hereinafter), the distance between the basal end 60 to the free edge end 63 of the upstanding guard 64 is defined as "T" (referred to as "upstanding guard width" hereinafter), the relationship of the upstanding guard width T, the first interval  $t_1$ , the second interval  $t_2$  and the third interval  $t_3$  is preferably  $t_1 + t_2 + t_3 \leq T$ , and the relationship is preferably  $t_3 \leq T/3$ , more preferably  $t_1 \leq t_2$ , most preferably,  $t_3 < t_1 < t_2$  from the viewpoint of exhibiting the aforesaid desired effects.

The upstanding guard width T is a matter of design choice depending on the type of



the absorbent article, but it is preferably 15 to 55 mm from the viewpoint of holding efficiency of the waste materials and the shape of the upstanding guard when it is worn.

In addition, the stress of each elastic member may be made non-uniform to obtain a desired advantageous effect.

5           For example, the stress of the elastic members 64c, 64d existing in the free end region 65 may be different from the stress of the elastic member of the other regions. According to the stress of an elastic member a little weaker than that of other regions' elastic member, soft feeling to the skin is obtainable and traces of the elastic member on the skin is preventable.

10           In addition, the stress of the central region 66 may be made smaller than that of the other region by adjusting the stress of the elastic member or another adjustment. This modification is preferable because the central region buffers the force or the like caused by the free end region and the stability of the free end region during wear can be ensured. However, if no elastic member is provided so as to extremely weaken the stress or an  
15           elastic member having extremely weak stress is provided, the central region collapses when receiving the outer force, failing to exhibit the buffering ability. Thus, the stress of the central region is preferably within the above-identified range as well as smaller than the other regions.

20           The disposable diaper of this embodiment can be made of any component members conventionally used in the art of disposable diapers, without any particular limitation, but it is preferred that the upstanding guard elastic members is composed of thread rubber made of known elastic materials.

The disposable diaper of this embodiment can be used in the same manner as a conventional flat-type disposable diaper.

25           In the disposable diaper 1 of the present invention, the free end region 65 having a larger stress tends to move to the narrowest part of crotch portion of the wearer such as the groin, the standing property of the upstanding guard 6 improves and the fit of the guard to the crotch portion is ensured to thereby prevent waste materials from leaking caused by crossing over the upstanding guard 6. Besides, sufficient antileakage property can be

obtained without rendering the stress of each elastic member unnecessarily high, so that pressure of contracting force of the elastic member to the skin can be reduced and diaper rash and skin sore can be prevented. That is, even if the stress of the whole upstanding guard is not so large, the standing property of the upstanding guard can be sufficiently retentive, so that the diaper fits to the wearer comfortably without hurting the skin during wear.

The disposable diaper of this embodiment can be produced by any methods as used in the production of conventional flat-type disposable diapers without any particular limitation.

10 Next, the second embodiment of the present invention will be explained.

Particularly, the points different from the first embodiment will be explained in detail hereinafter. Omission of explanation means that the points are the same as the first embodiment.

15 The disposable diaper 1 as the absorbent article of this embodiment, is the same as the first embodiment, including a liquid-permeable topsheet 2, a liquid-impermeable antileakage sheet 3 and a liquid-retentive absorbent core 4, having a substantially elongate shape, and being provided with upstanding guards 6 provided on the longitudinal left and right opposing side portions of the diaper.

20 When the upstanding guard 6 is sectioned into a free end region 65, a central region 66 and a basal end region 67 so as to trisect it in the widthwise direction, each region is provided with one upstanding guard elastic member 64, and the stress of the free end region 65 is larger than that of the other regions.

25 In particular, the disposable diaper 1 of this embodiment is provided with a plurality of upstanding guard elastic members 64 (64a', 64b', 64c') so that a gather is formed in the upstanding guard 6 over the entire region in the widthwise direction thereof, and the intervals t1' and t2' defined between the upstanding guard elastic members 64a' and 64b' and between 64'b and 64c', respectively, are almost equal.

The central region 66 has smaller stress than that of the free end region 65 and that of the basal end region 67. That is, in this embodiment, the stress of the free end region 65

is the largest, that of the basal end region 67 is the second largest, and that of the central region 66 is the smallest of all.

In particular, the free end region 65, the central region 66 and the basal end region 67 are provided with upstanding guard elastic members 64c', 64b' and 64a', respectively.

5 The interval t1' between the upstanding guard elastic members 64a' and 64b' and the interval t2' between the upstanding guard elastic members 64b' and 64c' is almost the same.

10 The stress of the upstanding guard elastic member 64a' is preferably 10 to 100 cN, more preferably 10 to 80 cN, from the viewpoint of exhibiting highly fit properties and preventing the excessively strong touch to the skin by allowing the basal end region 67 to reliably receive outer forces by movements of the wearer.

15 The stress of the upstanding guard elastic member 64b' is preferably 5 to 80 cN, more preferably 5 to 60 cN, from the viewpoint of ensuring the stability of the free end region (fit region) during use by allowing the central region to function as a buffer region for buffering the deformation of the diaper body or forces caused by movements of the wearer.

The stress of the upstanding guard elastic member 64c' is preferably 5 to 90 cN, more preferably 5 to 70 cN, from the viewpoint of exhibiting highly fit properties and preventing the excessively strong touch to the skin by reliably receiving forces by movements of the wearer.

20 The difference between the stress of the upstanding guard elastic member 64a' and upstanding guard elastic member 64b' or upstanding guard elastic member 64c' is preferably 5 cN or more, more preferably 10 cN or more, most preferably 10 to 50 cN, from the viewpoint of satisfactorily exhibiting the advantageous effect of each region, and from the view point of highly fit properties to the skin and good standing properties of the  
25 upstanding guard.

Since the elastic member is arranged to have different stresses, the stress of the free end region 65 is preferably 10 to 100 cN, more preferably 10 to 80 cN, from the viewpoint of exhibiting fit and antileakage properties in a high level, and softening the touch to the skin.

30 The stress of the central region 66 is preferably 5 to 80 cN, more preferably 5 to 60 cN, from the viewpoint of ensuring the stability of the free end region (fit region) during use by allowing the central region to function as a buffer region for buffering the

deformation of the diaper body or forces caused by movements of the wearer.

The stress of the basal end region 67 is preferably 5 to 90 cN, more preferably 5 to 70 cN, from the viewpoint of exhibiting highly fit properties and preventing the excessively strong touch to the skin by allowing the basal end region 67 to reliably receive forces by movements of the wearer.

The stress of the free end region 65 is preferably less than five times as large as the other regions, from the viewpoint of the coexistence of the pressure and fit to the skin. Specifically, the difference between the stress of the free end region 65 and that of the basal end region 67 or the central region 66 is preferably 15 cN or more in a 50% stretched condition, more preferably 10 cN or more, most preferably 10 to 50 cN, from the viewpoint of satisfactorily exhibiting the advantageous effect of each region, and from the viewpoint of highly fit properties to the skin and good standing properties of the upstanding guard.

The disposable diaper of this embodiment can be used in the same manner as the one of the first embodiment, exhibiting the same advantages, and can be produced in the same manner.

The disposable diaper of this embodiment can be made of any component members, which are conventionally used in the art of disposable diapers, without any particular limitation.

Various selections are available for the materials of the upstanding guard used in the first embodiment and the second embodiment. Liquid impermeable materials are preferred for the material of the upstanding guard from the viewpoint of exhibiting further improved antileakage properties. Among of all, the embodiment using, as the material of the upstanding guard, a laminate sheet prepared by laminating a nonwoven fabric and a liquid impermeable film is the particularly preferable embodiment in the absorbent article of the present invention. There may be cases where the skin irritates by the use of the laminate sheet. In order to prevent this, it is effective to lower the film rigidity; for example, a film having a basis weight of less than 20 g/m<sup>2</sup> may be used. The preferred film is a nonporous moisture permeable sheet comprising an elastomer of a polyurethane and/or ester and a polyolefinic thermoplastic resin, which is disclosed in col. 3, line 1 to col. 4, line 27 of Japanese Patent Laid-open No. 9-201909. The nonwoven fabric and the

liquid impermeable film can be laminated by a method of adhering using a hot melt adhesive, heat sealing, ultrasonic sealing, which are conventionally used in the art of disposable diapers, without any particular limitation. In addition, as a liquid impermeable material, a film sheet made of thermoplastic resin may be used. A liquid impermeable and moisture permeable sheet prepared by mixing a filler with a thermoplastic resin and stretching the film made of the mixture comprising the filler and the thermoplastic resin may also be used. Examples of the thermoplastic resin include polyolefins such as polyethylene and polypropylene, polyesters and polyvinylalcohol.

It is apparent that the absorbent article of the present invention is not limited to the aforementioned embodiments and that the present invention is changeable in various manner within the scope of the invention.

For example, the present invention is applicable to a sanitary napkin, a pad for incontinence or the like, other than a disposable diaper.

In the first embodiment, the form, material or the stretching percentage of the elastic member may be changed to thereby modify the stress of each elastic member.

The interval between the adjacent elastic members and the stress of each elastic member are not limited to the aforementioned range but are changeable, for example, as follows:

1: The interval arranged between the adjacent elastic members can be narrowed to make the stress of the region large, or the interval can be widen to make the stress of the region small,

2: The stress of the elastic member can be made large to make the stress of the region large, or the stress of each elastic member can be made small to make the stress of the region large.

3: Adjusting the interval between the adjacent elastic members.

The present invention is not intended to define the configuration of the upstanding guard but to define the stress of the region formed in the upstanding guard. Therefore, the configuration of the upstanding guard is changeable within the scope of the present invention.

In addition, another upstanding guard may be further applied to the waist portion. In addition, elastic members are applied to leg portions to thereby form a gather around the leg portions.

The third embodiment of an absorbent article according to the present invention will be described hereinafter.

Particularly, the points different from the first embodiment will be explained in detail hereinafter. Omission of explanation means that the points are the same as the first embodiment.

5 A disposable diaper 1 as an absorbent article of this embodiment includes, as shown in Figs. 4 and 5, a liquid-permeable topsheet 2, a liquid-impermeable antileakage sheet 3 and a liquid-retentive absorbent core 4, a pair of leg portions 7 being formed outwardly of left and right opposing side edges of the absorbent core 4, a pair of  
10 upstanding guards 6 each having an upstanding guard elastic member(s) 64 being formed on longitudinal left and right opposing side portions. By doing this, gathers are formed on each upstanding guard 6.

In the disposable diaper 1 of this embodiment, the absorbent core 4 is fixedly held in a sandwiching manner by and between both the topsheet 2 and the antileakage sheet 3.  
15 The topsheet 2 and the antileakage sheet 3 extend beyond the longitudinal left and right opposing side edges of the absorbent core 4, thereby forming a pair of left and right leg portions 7 which contact the legs of the wearer when in use on the wearer.

A pair of waist opening portions 8, one in a stomach-side portion A which is located on the stomach side of the wearer and the other in a back-side portion B which is  
20 located on the back side of the wearer when in use on the wearer, are each provided with a waist portion elastic member 81 on which waist gathers are formed. Each of opposing left and right side edge portions B1, B2 of the back-side portion B is provided with a tape fastener 11 for fastening the disposable diaper 1.

Each upstanding guard 6 is formed by disposing a strip-like sheet material 61 from  
25 a stomach-side waist opening edge 82A to a back-side waist opening edge 82B. Each sheet material 61 is firmly secured at its longitudinal end edge to the topsheet 2 on the waist opening portion 8 side and fixedly bonded at its longitudinal side portion to the topsheet 2 in the corresponding leg portion 7. Accordingly, a basal end 60 of the upstanding guard 6 is located on the topsheet 2 in the leg portion 7.

30 Disposed in the back-side portion B which is located on the back side of the wearer when in use on the wearer, is a back-side expansible portion 9. The back-side expansible portion 9 is formed by arranging a plurality of back-side elastic members 91 along a widthwise direction of the disposable diaper 1.

In the disposable diaper 1 according to this embodiment, the upstanding guards 6 are composed of the breathable sheet material 61, while the leg portions 7 are composed of the sheet material 61 and a breathable outer layer nonwoven fabric 5 which is disposed on an outer surface of the antileakage sheet 3. A plurality of the upstanding guard elastic members 64 are disposed between the basal end 60 and a free edge end 63 of each upstanding guard 6. The upstanding guard elastic member 64 is also disposed at the free edge end 63.

More specifically, a single upstanding guard elastic member 64 is disposed at the free edge end 63 and four upstanding guard elastic members 64 are disposed between the free end edge 63 and the basal end 60. The expression "a plurality of" as used above refers to a plurality of upstanding guard elastic members 64 being disposed at each upstanding guard 6 and does not refer to a plurality of upstanding guard elastic members 64 being necessarily disposed at the free edge end. The upstanding guard elastic members 64 are fixedly held in a sandwiching manner by and between those portions of the sheet material 61 folded back at the free edge end 63 through an adhesive agent. The upstanding guard elastic members 64 each are arranged in parallel to the free edge ends 63 and along the longitudinal direction of the disposable diaper 1.

The upstanding guard 6 is provided with an elastic member by arranging the interval between the adjacent elastic members as in the first embodiment or by making the interval equal and the stress of each elastic member different as in the second embodiment, whereby, when each guard is sectioned into a free end region, a central region and a basal end region so as to trisect it in the widthwise direction, the stress of the free end region becomes larger than that of the other regions.

The upstanding guards 6 are preferably from 10 to 150 mm in widthwise length W dimension.

Also, the number of the upstanding guard elastic members 64 are preferably from 3 to 20 pc. An interval T between adjacent upstanding guard elastic members 64 is preferably from 2 to 50 mm.

In the present invention, it is also accepted that the interval between the upstanding guard elastic member located at the free edge end 63 and the upstanding guard elastic member located proximate thereto is from 1 to 10 mm and the intervals between the remaining adjacent upstanding guard elastic members are gradually increased by from 1 to

10 mm or otherwise the interval between the upstanding guard elastic member located at the free edge end 63 and the upstanding guard elastic member 64 located proximate thereto is from 4 to 40 mm and the intervals between the remaining adjacent upstanding guard elastic members are gradually reduced by from 1 to 10 mm.

5           Also, in this embodiment, stress of the free edge end 63 are greater than that of those areas where all the remaining upstanding guard elastic members 64 are disposed. In addition, stress of the upstanding guard elastic member 64 disposed at free edge end 63 is preferably greater than that of all the remaining upstanding guard elastic members 64 disposed at the area between the free edge end 63 and the basal end 60.

10           Specifically, the stress of the upstanding guard elastic member 64 disposed at the free edge end 63 is preferably from 10 to 1000 gf and preferably greater by from 5 to 500 gf than that of all the remaining upstanding guard elastic members 64.

The "stress" can be measured in the following manner.

#### <Method for Measuring Stress of Elastic Members>

15           An elastic member was cut out having a length dimension of 150 mm, the same was subjected to a tensile test under the conditions of 100 mm in chuck distance and 300 mm/min in rate of pulling using a Tensilon tensile test machine (manufactured by Orientic Corp.) and the stress at 100% of stretching was measured.

20           The basal ends 60 are preferably located adjacent to the corresponding side edges of the antileakage sheet 3, respectively. In this embodiment, the basal ends 60 are located adjacent to the corresponding side edges of both the topsheet 2 and the antileakage sheet 3, respectively. That portion of the disposable diaper 1 which is located widthwise outwardly of each basal end 60 is composed only of a laminated sheet which is obtained by adhering the sheet material 61 and the outer layer nonwoven fabric 5 together.

25           The leg portions 7 are preferably from 5 to 50 mm in widthwise length L dimension (the length between the widthwise side edge of the diaper and the side edge of the absorbent core) and that portion which is composed only of the laminated sheet is preferably from 5 to 50 mm in widthwise length L' dimension. The basal ends 60 are formed by firmly securing the sheet material 61 to the outer layer nonwoven fabric 5 in the  
30           leg portions 7 through an adhesive agent.



The material for forming the component members of the disposable diaper 1 of this embodiment will be described next.

As the material for forming the topsheet 2, the antileakage sheet 3, the absorbent core 4, the waist portion elastic members 81 and the fastening tapes 11, there can be used  
5 without any particular limitation those which are normally used for conventional disposable diapers.

Both the sheet material 61 and the outer layer nonwoven fabric 5 are breathable (air-ventilating). They are preferably 500 sec/100 cc or less and more preferably 100 sec/100 cc or less in degree of air-permeability. By making the degree of air-permeability  
10 500 sec/100 cc or less, the effective prevention of getting stuffy can be obtained.

Both the sheet material 61 and the outer layer nonwoven fabric 5 are preferably 3.0 g/cm<sup>2</sup> or more, and more preferably 5.0 g/cm<sup>2</sup> or more in water pressure resistance (water repellency). By making the water pressure resistance 3.0 g/cm<sup>2</sup> or more, it can be prevented that exudates seep out and leak from the upstanding guards or the exudates,  
15 which have climbed over the upstanding guards, seep and leak through the breathable portions in the leg portions.

Both the sheet material 61 and the outer layer nonwoven fabric 5 are preferably 1000 cN/50 mm or more and more preferably 1200 cN/50 mm or more in strength in the cross machine direction (CD). By making the strength 1000 cN/50 mm or more, it can be prevented that the fastening tapes are peeled off at their root portions.  
20

The material for forming the sheet material for satisfying such conditions may include a spunbond nonwoven fabric, a spunbond/meltblown/spunbond nonwoven fabric (SMS), a spunbond/meltblown/meltblown/spunbond nonwoven fabric (SMMS), a heatroll nonwoven fabric, an airtough nonwoven fabric and the like. Similarly, the material for  
25 forming the outer layer nonwoven fabric may include a spunbond nonwoven fabric, SMS, SMMS, a heatroll nonwoven fabric, an airtough nonwoven fabric and the like.

The degree of air-permeability, the water pressure resistance and the strength can be measured in the following manner.

Degree of Air-Permeability: Measured in accordance with JIS-P8117. That is, a  
30 sheet was cut having the dimensions of 70x70 mm and the time required for air of 100 ml to pass therethrough was measured using an air-permeability degree measuring instrument (Oken type air-permeability degree measuring instrument).

#### <Water Pressure Resistance>

Water pressure resistance is measured with the use of an apparatus 100, as shown in Fig. 9, wherein two cylindrical tubes 101, 101' having an inner diameter of about 3.5 cm and a sectional area of 9.6 cm<sup>2</sup> sandwich a test sheet (nonwoven fabric or sheet material) 110 through rubber packings 102, 102', the cylindrical tubes 101, 101', rubber packings 102, 102', and the test sheet 110 are fixed with a clamp (not shown in Figures), and the upper cylindrical tube 101 is provided with a tube 103 on the upper end thereof. Through the tube 103, physiological saline is poured into the cylindrical tube 101 at a rate of 4g a minute, and the time period until the physiological saline leaks to the lower cylindrical tube 101' passing through the test sheet 110 is measured. The data of the time thus obtained are applied to the measurement formula mentioned below to determine water pressure resistance.

$$\text{Water pressure resistance (g/cm}^2\text{)} = \frac{\text{measuring time (seconds)} \times (4\text{g}/60 \text{ seconds})}{9.6 \text{ cm}^2}$$

The physiological saline was prepared by solving it in ion exchange water to give a content of 10.9 % by weight.

Strength: A test piece was cut out having a width of 25 mm in a machine direction (MD) and a length of 150 mm in a direction perpendicular to the MD ( i.e., cross machine direction (CD)). This test piece was subjected to a tensile test under the conditions of 50 mm in chuck distance and 300 mm/min in rate of pulling in the cross machine direction (CD) using a Tensilon tensile test machine (manufactured by Orientic Corp.), and the strength of the test piece, when fractured, was measured.

As the upstanding guard elastic members 64, there can be used those elastic members known in the art without any particular limitation inasmuch as they can satisfy the above stress. The upstanding guard elastic member(s) disposed at each free edge end and the remaining upstanding guard elastic members may be formed of different materials so that their stress will be different, or otherwise they may be formed of a same material but with differences in stretch percentage, etc.

The disposable diaper 1 of this embodiment can be used in the same manner as the typical flat type disposable diaper.

In the disposable diaper 1 of this embodiment, since a plurality of the upstanding guard elastic members 64 are disposed at each upstanding guard 6, pocket portions are formed each between adjacent upstanding guard elastic members 64. Accordingly, the waste materials, which should have climbed over the upstanding guards 6, would be caught by those pocket portions, thus enabling to effectively prevent the leakage from the leg portions. Moreover, since the leg portions 7 are composed only of a breathable sheet, the disposable diaper 1 exhibits a good breathability and does not get stuffy in use on the wearer.

The "pocket portions" as used herein include not only those which are continuously formed in the longitudinal direction of the disposable diaper but also those consisting of a plurality of concavities which are intermittently formed. Especially, in the case where the gathers are formed by properly arranging the upstanding guard elastic members as in this embodiment, a plurality of concavities and convexities are formed between adjacent upstanding guard elastic members as the gathers are formed. The "pocket portions" as used in this specification include those consisting of a plurality of concavities which are intermittently formed in the longitudinal direction of the disposable diaper between the adjacent upstanding guard elastic members.

The disposable diaper of this embodiment can be obtained by fixedly holding in a sandwiching manner the absorbent core and the waist elastic members by and between both the topsheet and the antileakage sheet and then bonding the sheet material, on which the plurality of elastic members are arranged at predetermined intervals, to a predetermined position in accordance with the method known per se.

Although the disposable diaper 1 having no gathers in the leg portions 7 is exemplified in the third embodiment, the present invention should not be limited to this. Instead, the disposable diaper may have leg gathers formed by properly arranging the elastic members in the leg portions. By doing so, the effect of leakage prevention can be enhanced owing to the function of the leg gathers.

Although a flat type disposable diaper is exemplified in the third embodiment, the present invention is also applicable to a briefs type disposable diaper (in which the longitudinal direction is the up and down directions of the disposable diaper), a sanitary napkin and the like.

Although the disposable diaper in which the basal end 60 of each upstanding guard

is located in the leg portion 7, i.e., the basal end 60 is not located on the absorbent core, is exemplified, the present invention is not limited to this. The basal end 60 may be located on the absorbent core 4. By doing so, even if the waste materials should climb over the upstanding guards, they would be absorbed by the absorptive portions which are located outwardly of the basal ends. Accordingly, the effect of leakage prevention is more enhanced.

Further, a waist portion upstanding guard having an upstanding guard elastic member(s) may be formed both on the stomach-side portion and the back-side portion or either one side thereof in order to prevent leakage from the waist portion.

It is also accepted that the upstanding guard or the elastic member(s) disposed at the upstanding guard is curved such that an end portion of the upstanding guard or the elastic member(s) disposed at the upstanding guard is located adjacent to a support portion of a tape fastener.

Further, that area of the upstanding guard between the basal end portion and the free end portion may be laminated with either a liquid-permeable or a liquid-impermeable film.

The upstanding guard itself may be composed of an expansible sheet material.

Further, the stress of the upstanding guard elastic member(s) disposed at the free edge end may be made greater than that of the remaining elastic members by bundling a plurality of elastic members on the free edge end or by other means.

As the material constituting the absorbent core, there can be used a water-repellent mount, a nonwoven fabric and a liquid-impermeable film. Also, a lower portion and side portions of the absorptive portion may be covered with those materials. By doing so, it can effectively be prevented that the waste materials, which have been once absorbed, are caused to seep out of the absorbent core by the wearer's body pressure.

The fourth embodiment of an absorbent article according to the present invention will be described hereinafter.

Particularly, the points different from the first embodiment will be explained in detail hereinafter. Where detailed explanations are omitted, the explanation of the first embodiment should be pertinently applied thereto.

A disposable diaper 1 as an absorbent article of this embodiment has, as shown in Fig. 6, Fig. 7 and Fig. 8, a substantially elongate absorptive body 10 including a liquid-

permeable topsheet 2, a liquid-impermeable antileakage sheet 3 and a liquid-retentive absorbent core 4.

The surface of the antileakage sheet 3 is provided with an outer layer nonwoven fabric 5. The outer layer nonwoven fabric 5 extends such that the both side edges thereof  
5 locate outwardly of the side edges 4a of the absorbent core 4. The extended portion of nonwoven fabric 5 forms a pair of left and right leg portions 7.

Therefore, the disposable diaper 1 of this embodiment is provided with an upstanding guards on the longitudinal left and right opposing side edges and the longitudinal opposing end edges of the absorptive body 10, respectively. Each upstanding  
10 guard is provided with a wide elastic portion 64. That is, the upstanding guard having a wide contracting portion as the back-side expansible portion is arranged on the back-side portion.

The disposable diaper 1 of this embodiment includes, as upstanding guards 6, side upstanding guards 6C, 6C arranged on the left and right opposing sides of the diaper, back-  
15 side upstanding guard 6B arranged on the back-side portion B and stomach-side upstanding guard 6A arranged on the stomach-side portion A. In addition, the elastic portion 64 includes a side elastic portion 64C arranged on the side upstanding guards 6C, 6C, a back-side elastic portion 64B arranged on the back-side upstanding guard 6B and a stomach-side elastic portion 64A arranged on the stomach-side upstanding guard 6A.

20 In more detail, the side upstanding guards 6C, 6C, are formed on left and right opposing sides of the diaper by disposing sheet materials 61 for forming an upstanding guard. The sheet materials 61 are extended beyond the respective opposing sides of the absorbent core 4 and sealed to the outer layer nonwoven fabric 5.

The back-side upstanding guard 6B and stomach-side upstanding guard 6A are  
25 formed on the back-side portion B and stomach-side portion A, respectively, by disposing the sheet materials 61 in such a manner that the outer end edge 61a thereof locates at the end edge of the waist opening portion 8.

The upstanding guards 6A, 6B, 6C and 6C each fixedly adhere to the topsheet 2 in the upper position of the absorbent core 4 to thereby form a basal end 60.

30 The side elastic portions 64C, 64C, back-side elastic portion 64B and stomach-side

elastic portion 64A are formed by arranging a plurality of string-like elastic members 64a at a predetermined interval. Each elastic member 64a is provided along the longitudinal direction and over the generally entire area through the longitudinal direction of the upstanding guard.

5 In connection with the width of each upstanding guard, i.e., the length from the free edge end 63 to the basal end 60, it is preferable that the width of the side upstanding guards 6C, 6C is 20 to 100 mm, that of the back-side upstanding guard 6B is 20 to 100 mm and that of the stomach-side upstanding guard 6A is 20 to 80 mm.

10 The width of the elastic portions 64A, 64B and 64C are each preferably 10 mm or more. The width of 10 mm or more enables to enhance the fit property for contacting the skin on surface and to fully exhibit the desired advantages of the present invention.

The side elastic portions 64C, 64C are each formed by disposing four pieces of elastic members 64a, the back-side elastic portion 64B is formed by disposing four pieces of elastic members 64a and the stomach-side elastic portion 64A is formed by disposing  
15 three pieces of elastic members 64a.

Thus, "the wide elastic portion" is referred to the area where the contracting property exhibits by the arrangement of elastic members or the like. For example, the area of the side elastic portion 64C is from the elastic member closest to the free edge end 63 to the one closest to the basal end.

20 The side upstanding guard 6C, back-side upstanding guard 6B and stomach-side upstanding guard 6A each are provided with an elastic member by arranging the interval between the adjacent elastic members as in the first embodiment or by making the interval equal and the stress of each elastic member different as in the second embodiment, whereby, when each guard is sectioned into a free end region, a central region and a basal  
25 end region so as to trisect it in the widthwise direction, the stress of the free end region becomes larger than that of the other regions.

The side upstanding guard 6C, the back-side upstanding guard 6B and the stomach-side upstanding guard 64 are mutually connected.

30 That is, in this embodiment, the side upstanding guards 6C, the back side upstanding guard 6B and the stomach side upstanding guard 6A are in a form of belt, and the longitudinal end portions of the side upstanding guards 6C are joined to the longitudinal end portions of the back-side upstanding guard 6B and the stomach side upstanding guard 6A, respectively, whereby a rectangular opening portion 12 is formed by

each upstanding guard.

The upstanding guards 6A, 6B, 6C, 6C are, as shown in Figs.7 and 8, a plate-like upstanding guard forming almost horizontal surface. The upstanding guards 6A, 6B, 6C, 6C of plate-like form are brought into direct surface contact with the wearer's skin in use.

5 The upstanding guards 6A, 6B, 6C, 6C are connected such that the elastic members 64a provided thereon are overlaid with each other, i.e., such that the longitudinal end portions of the elastic member 64a in the side elastic portions 64C, 64C are located on the stomach- side elastic portion 64A and back-side elastic portion 64B, respectively. By the contracting force of the elastic portions 64A, 64B, 64C, 64C, the absorptive body of the  
10 disposable diaper comprising the absorbent core, topsheet and antileakage sheet is curved so as to give a generally cup form. Further, the upstanding guards 6A, 6B, 6C, 6C defines a pocket portion 13 between the upstanding guards 6A, 6B, 6C, 6C and in the lower position thereof between the upstanding guards 6A, 6B, 6C, 6C and the topsheet 2.

15 The size of the opening portion 12 can be selected depending on the diaper for infants or the diaper for adults.

In the disposable diaper 1 of this embodiment, an elastic member is not disposed in the leg portion 7.

The disposable diaper 1 of this embodiment can be used in the same manner as the typical flat type disposable diaper.

20 Since the disposable diaper 1 of this embodiment is structured as mentioned above, the upstanding guards 6A, 6B, 6C, 6C each contact the wearer's skin in the surface, whereby the fit property by the upstanding guards cannot be prevented in any wearing condition and good fit property is exhibited. In addition, the discharging portion of the wearer is located at the opening portion 12 with a pocket portion 13 being formed around  
25 the surrounding area, so that the waste materials are allowed to be discharged directly towards the absorbent core and the waste materials, which cannot be absorbed at a time and migrated over the topsheet, can be stocked in the pocket portion 13 for a time being to be reabsorbed. Thus, the disposable diaper 1 of this embodiment is excellent in the antileakage property.

30

Now, a method of producing the disposable diaper of this embodiment will be described.

The method of the producing the disposable diaper of this embodiment comprises steps of;

transferring continuous bodies each of first and second sheet materials for forming the upstanding guards provided on the left and right opposition sides in parallel with each other,

5 applying a continuous body of a third sheet material for forming the front- and back-side upstanding guards to the continuous bodies of the first and the second sheet materials so as to cross thereto, thereby forming a continuous body of a composite sheet material in a ladder shape in which the first, second and third sheet materials for forming upstanding guards are compound,

10 interposing an absorbent core between a continuous body of an antileakage sheet and a continuous body of a topsheet thereby forming a continuous body of an absorptive body,

disposing the continuous body of composite sheet material at a predetermined position of the continuous body of the absorptive body thus obtained, and finally

15 cutting the resultant continuous body at a predetermined position to thereby obtain an individual absorbent article.

The description of the fourth embodiment exemplifies the upstanding guards in which the basal end 60 thereof is located on the absorbent core 4, but the present invention should not be limited to this. The basal end 60 may be located on the leg portion 7.

20 In addition, the present invention should not be limited to the exemplified disposal diaper which has no gathers in the leg portion but may be provided with leg gathers.

The second embodiment is explained by exemplifying a flat type disposable diaper, but the present invention, which should not be limited to this, is applicable to a shorts type disposable diaper comprising the fixture sealing of the left and right opposing sides of the absorptive body, as well as an incontinent pad or a sanitary napkin.

25 The fourth embodiment exemplifies the diaper having upstanding guards on the both of the front side and rear side of the disposable diaper, i.e., both on the stomach-side portion and the back-side portion of the diaper, but the upstanding guard may be disposed at least on either one side thereof.

30 In addition, the absorbent core may be divided in a longitudinal direction and/or in the width direction, or provided with some cuts. Specifically, the absorbent core may be formed by arranging three pieces of strip rectangular absorbent cores in line, provided with



cuts on the both lateral sides or both end portions of the diaper, whereby the formation of the opening portion 12 is stably maintained and slippage is prevented.

The exemplified elastic portion 64 is formed by a plurality of string elastic members, but elastic members in a form of belt can be used. Alternatively, the elastic  
5 portion may be formed by the sheet material having elastic contractivity.

#### Industrial Applicability

The absorbent article of the present invention has the upstanding guards giving nice and comfortable fit to the wearer's skin and exhibits excellent anitleakage properties.

This application claims the priority of Japanese Patent Application Nos. 11-63345  
10 filed March 10, 1999 and 11-348995 filed December 8, 1999, which are incorporated herein by reference.

## CLAIMS

1. An absorbent article which comprises a liquid-permeable topsheet, a liquid-impermeable antileakage sheet and a liquid-retentive absorbent core, said absorbent article being provided with upstanding guards along the longitudinal left and right opposing side portions thereof,

wherein the upstanding guards are provided with a plurality of upstanding guard elastic members which form a gather in the widthwise direction of the upstanding guard; and

wherein the upstanding guard is sectioned in the widthwise direction into a free end region, a central region and a basal end region, the stress in the free end region being larger than that of the other regions.

2. The absorbent article according to claim 1, wherein the plurality of upstanding guard elastic members are arranged such that the intervals therebetween are unequal in the widthwise direction of the upstanding guard.

3. The absorbent article according to claim 1, wherein the plurality of upstanding guard elastic members have a non-uniform stress.

4. The absorbent article according to claim 1, wherein the plurality of upstanding guard elastic members are arranged such that the intervals therebetween are equal in the widthwise direction of the upstanding guard, and the stress of the upstanding guard is non-uniform.

5. The absorbent article according to claim 1, wherein the central region has smaller stress than that of the free end region and the basal end region.

6. The absorbent article according to claim 1, wherein the upstanding guard comprises a breathable sheet material,

wherein a pair of leg portions of the absorbent article comprise the sheet material and a breathable outer layer nonwoven fabric disposed on the surface of the antileakage sheet.

7. The absorbent article according to claim 1, wherein basal ends of the upstanding guards adjoin respective side edges of the antileakage sheet.
8. The absorbent article according to claim 6, wherein the sheet material and the outer layer nonwoven fabric are 1000 cN/50 mm or more in CD (cross machine direction) strength.
9. The absorbent article according to claim 1,  
wherein the upstanding guards are also formed on the stomach-side portion and the back side portion, and  
wherein the upstanding guards formed on the left and right opposing sides of the absorbent article and the upstanding guards formed on the stomach-side portion and the back side portion are mutually connected.
10. The absorbent article according to claim 1, wherein each region is provided with one upstanding guard elastic member.
11. The absorbent article according to claim 1, wherein the free end region is provided with two upstanding guard elastic members and each of the central region and basal region is provided with one upstanding guard elastic member.
12. The absorbent article according to claim 1, wherein the stress of the free end region is larger than that of the basal end region which, in turn, is larger than that of the central region.
13. The absorbent article according to claim 1, wherein the absorbent article is a disposable diaper.
14. The absorbent article according to claim 1, wherein the absorbent article is a sanitary napkin.
15. The absorbent article according to claim 1, wherein the absorbent article is an

incontinence pad.

16. The absorbent article according to claim 1, wherein pocket portions are formed between adjacent upstanding guard elastic members for preventing leakage therefrom.

17. An absorbent article which comprises a liquid-permeable topsheet, a liquid-impermeable antileakage sheet and a liquid-retentive absorbent core, said absorbent article comprising a pair of leg portions and being provided with upstanding guards along the longitudinal left and right opposing side portions thereof,

wherein the upstanding guards are provided with a plurality of upstanding guard elastic members which define pocket portions therebetween; and

wherein no gather are formed in the leg portions.

FIG. 1

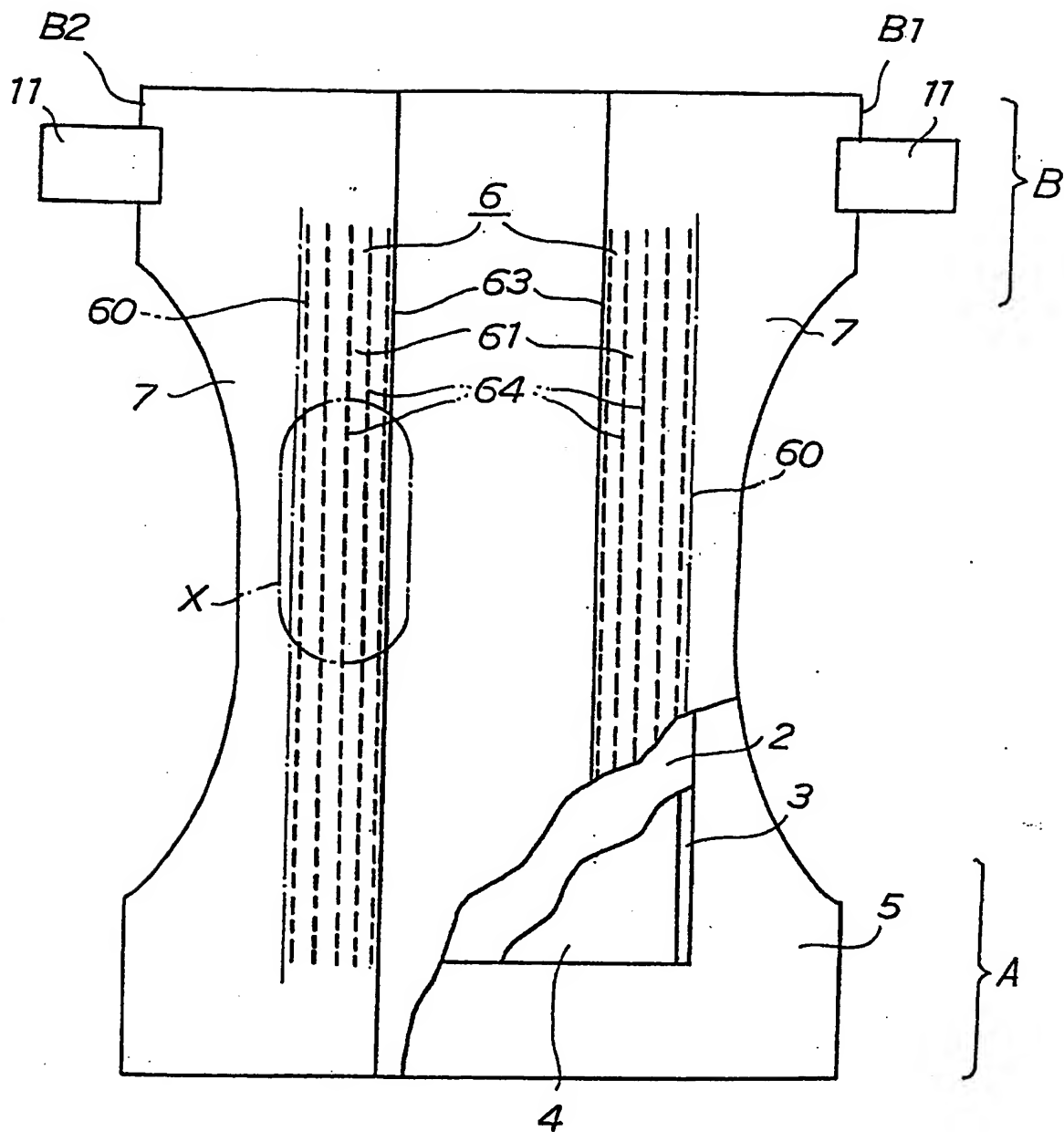


FIG. 2

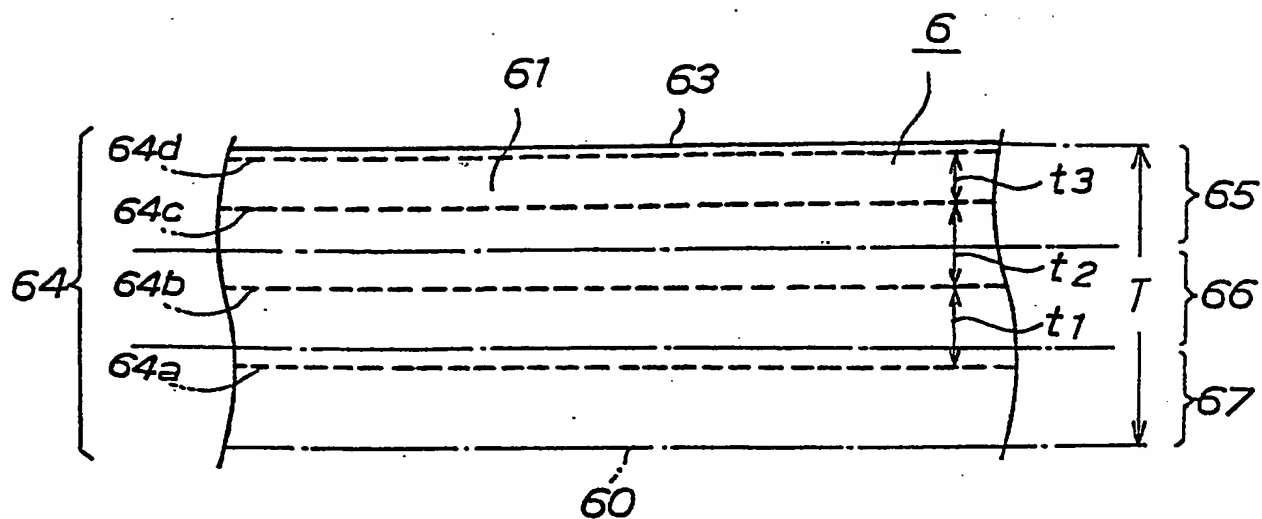


FIG. 3

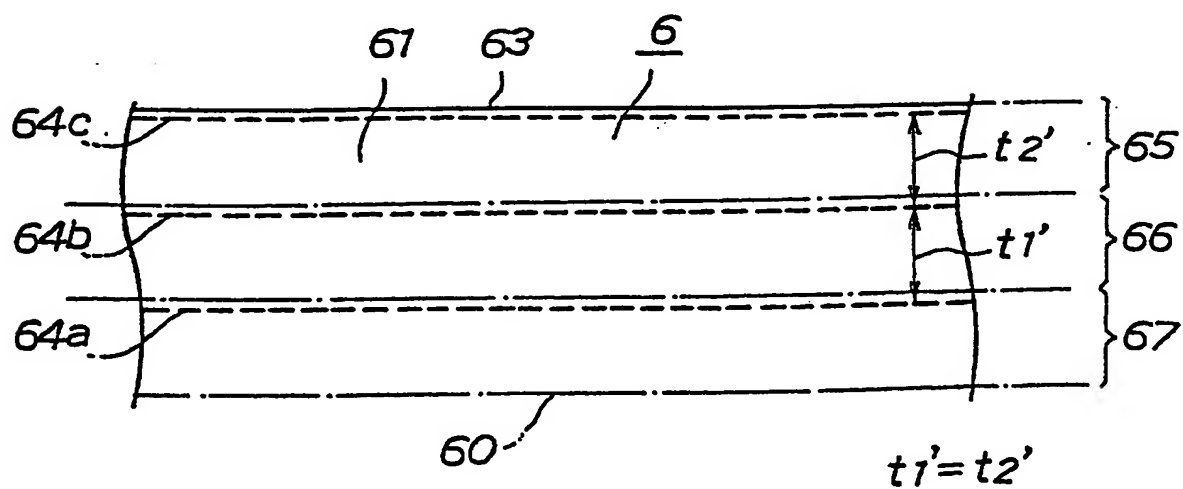


FIG. 4

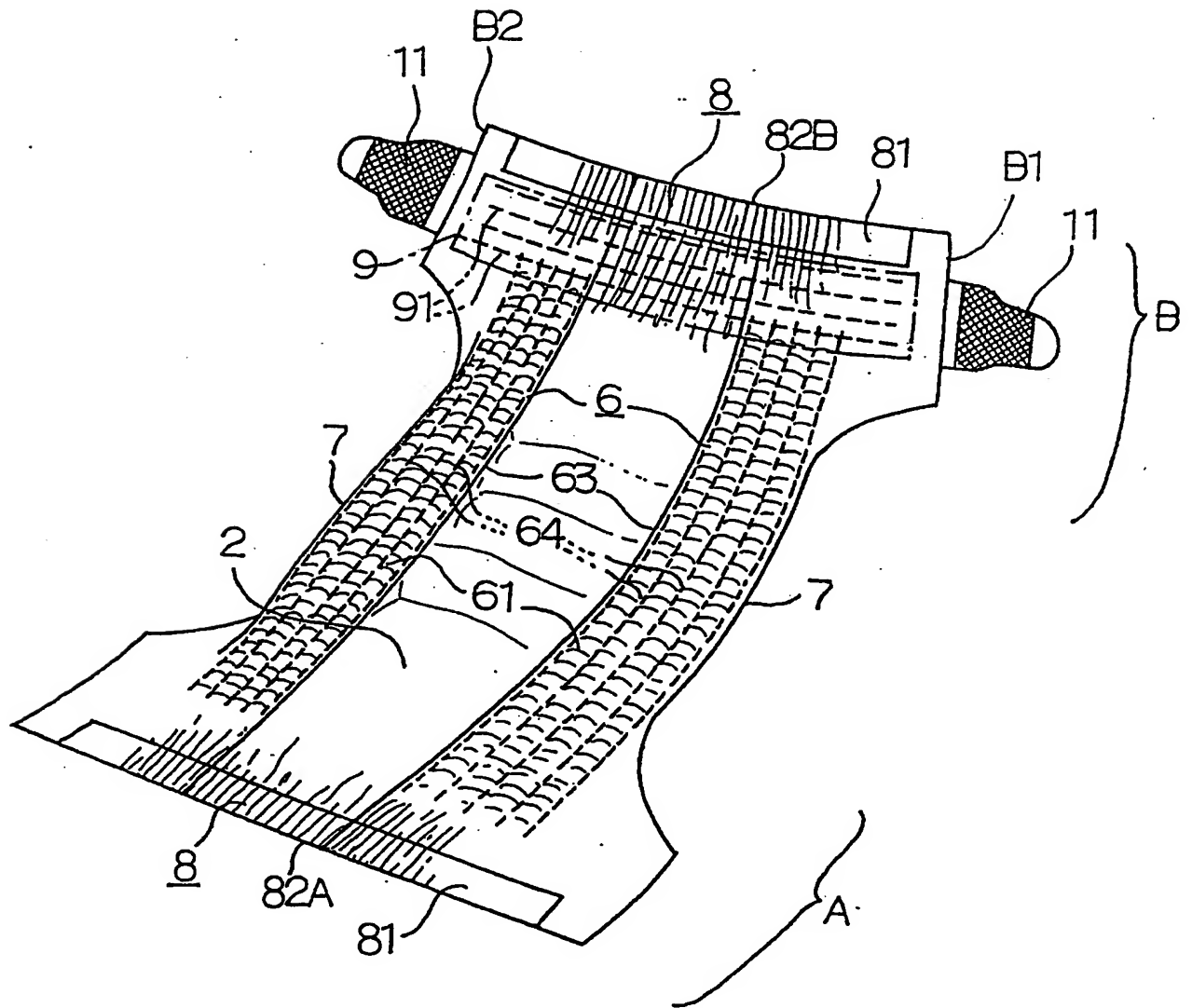






FIG. 6

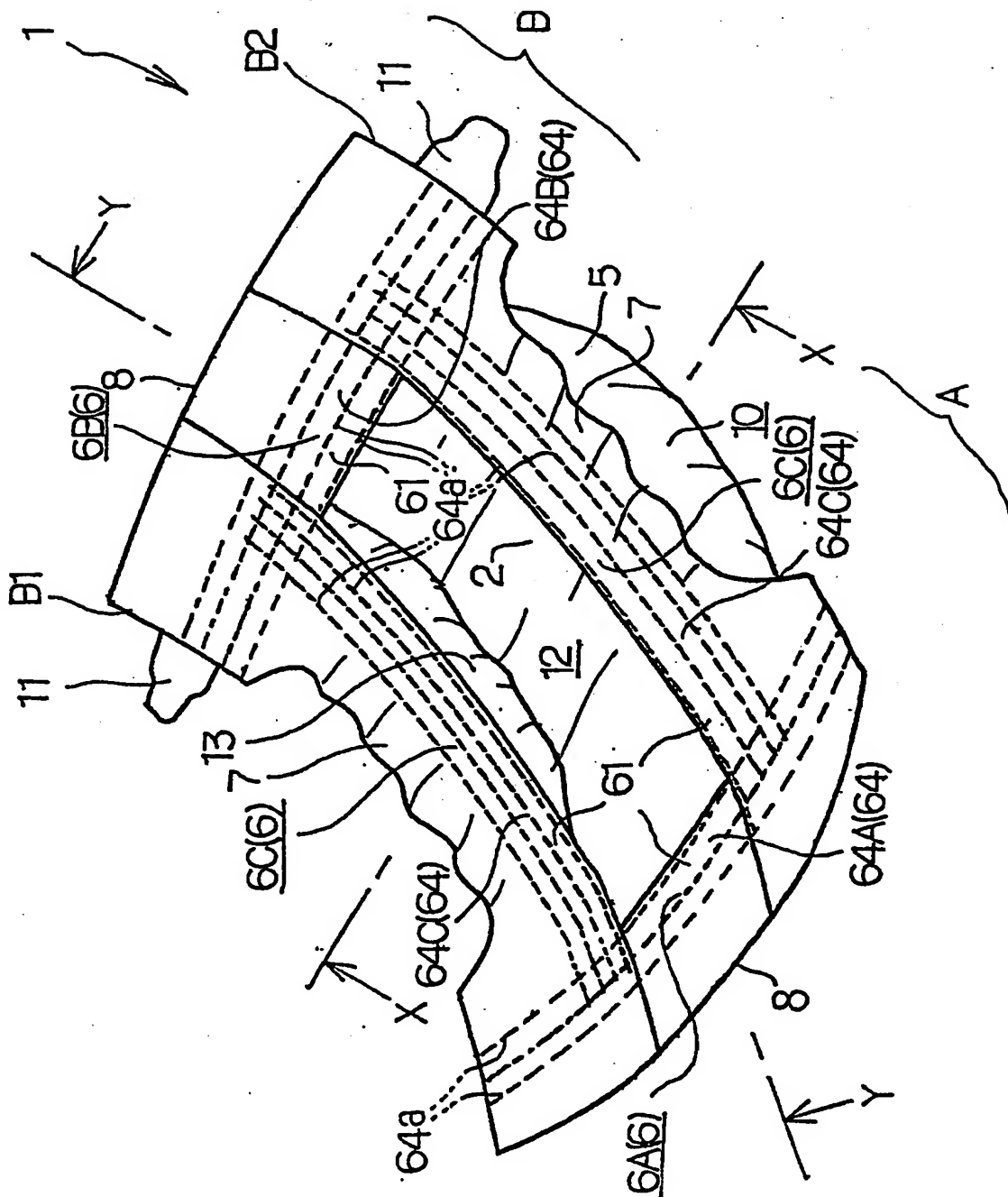


FIG. 7

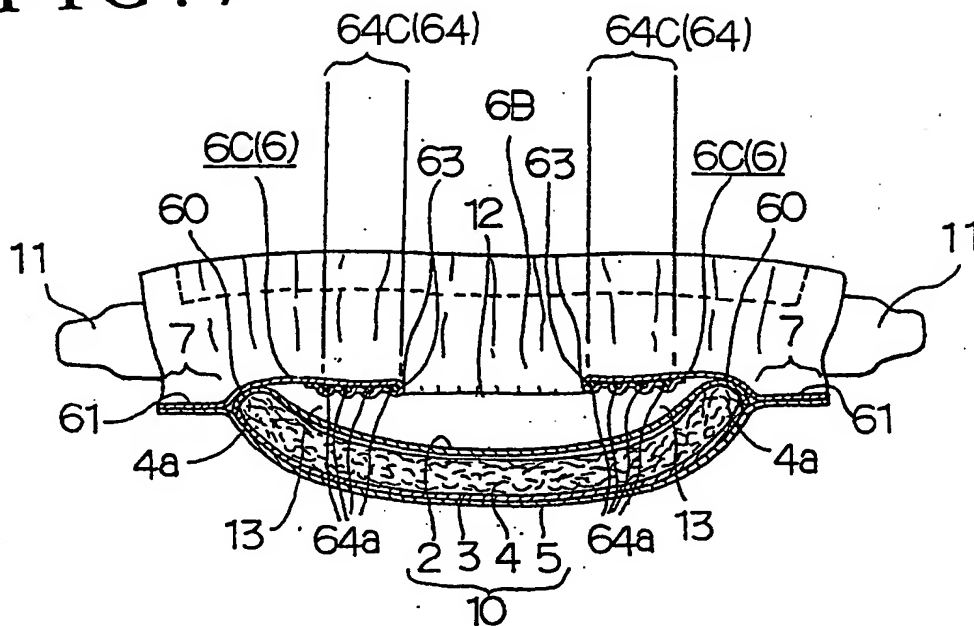


FIG. 8

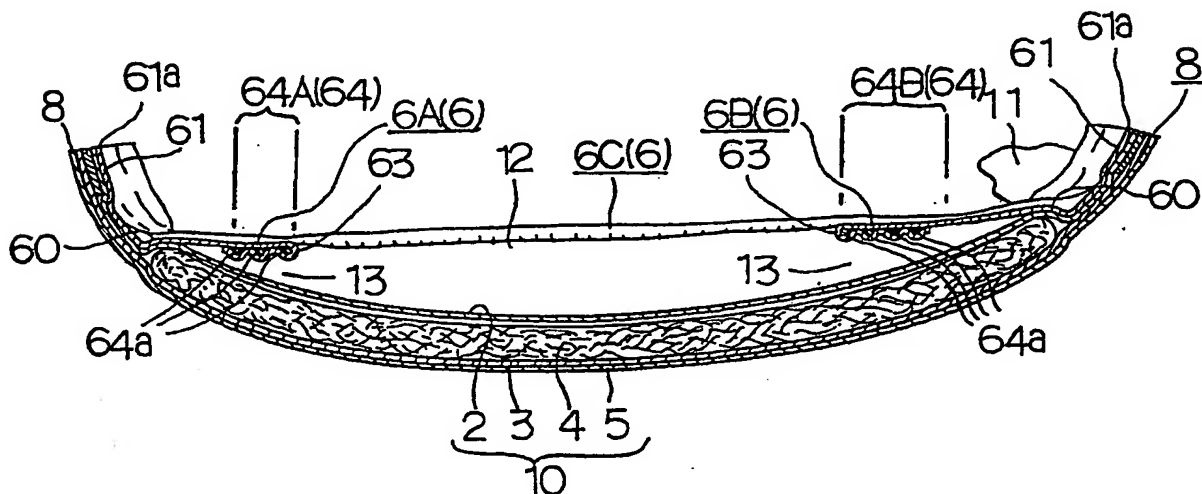
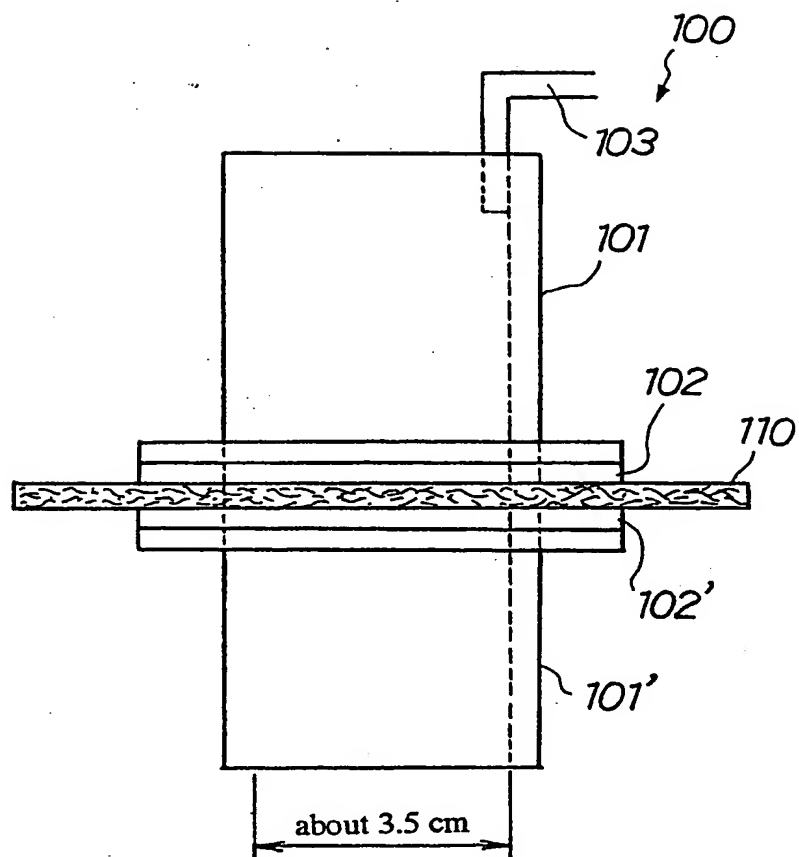


FIG. 9



# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/JP 00/01368

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61F13/15

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 769 838 A (BUELL KENNETH BARCLAY ET AL) 23 June 1998 (1998-06-23)  page 25, line 20 - line 41; figure 8 ---	1-3,6,7, 10,11, 13,15,16
Y	WO 97 20532 A (KIMBERLY CLARK CO) 12 June 1997 (1997-06-12) page 14, line 11 - line 21 page 26, line 25 -page 27, line 24	4,5,9,12
Y	page 32, line 1 -page 37, line 29; figures	4,5,9,12
X	page 31, line 28 - line 35 ---	17
X	EP 0 648 482 A (UNI CHARM CORP) 19 April 1995 (1995-04-19) column 4, line 20 - line 42 column 5, line 50 - line 56; claim 5; figures ---	1,3,7, 10,13-17
	-/-	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \* & \* document member of the same patent family

Date of the actual completion of the international search

30 May 2000

Date of mailing of the international search report

16. 06. 2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Douskas, K

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/JP 00/01368

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	EP 0 925 768 A (UNI CHARM CORP) 30 June 1999 (1999-06-30)  column 3, line 5 -column 5, line 55; claims; figures ---	1,3-5, 10,12, 13,15,17
P,A	EP 0 945 111 A (UNI CHARM CORP) 29 September 1999 (1999-09-29) column 3, line 30 -column 5, line 20; claims; figures ---	1-15
X	EP 0 321 732 A (HARTMANN PAUL AG) 28 June 1989 (1989-06-28) claims; figures -----	17
A		1-3,5, 12,13

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/JP 00/01368

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-16

Absorbent article with upstanding guards each guard having a plurality of upstanding guard elastic members and each elastic member having different stress.

2. Claim : 17

Absorbent article with upstanding guards each guard having a plurality of upstanding guard elastic members wherein n gather are formed in the leg portions.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP 00/01368

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5769838 A	23-06-1998	US 5836932 A	17-11-1998
		US 5569234 A	29-10-1996
		AU 5325396 A	23-10-1996
		AU 5382996 A	23-10-1996
		BR 9604800 A	09-06-1998
		CA 2216145 A	10-10-1996
		CA 2216640 A	10-10-1996
		CN 1183714 A	03-06-1998
		CZ 9703126 A	18-03-1998
		EP 0902674 A	24-03-1999
		EP 0818980 A	21-01-1998
		HU 9801605 A	28-10-1998
		JP 2904934 B	14-06-1999
		JP 10510335 T	06-10-1998
		JP 10505778 T	09-06-1998
		NO 974541 A	03-12-1997
		WO 9631178 A	10-10-1996
		WO 9631179 A	10-10-1996
		ZA 9602691 A	25-07-1996
WO 9720532 A	12-06-1997	AU 705076 B	13-05-1999
		AU 1057997 A	27-06-1997
		BR 9612575 A	27-07-1999
		CN 1203521 A	30-12-1998
		CZ 9801707 A	13-01-1999
		EP 0866682 A	30-09-1998
		HU 9902158 A	28-10-1999
		JP 2000500987 T	02-02-2000
		NZ 323595 A	29-03-1999
		PL 327039 A	09-11-1998
		SK 72798 A	11-01-1999
		CA 2166008 A	19-06-1997
		US 5904675 A	18-05-1999
EP 0648482 A	19-04-1995	JP 7112003 A	02-05-1995
		JP 7155344 A	20-06-1995
		AU 685833 B	29-01-1998
		AU 7448194 A	04-05-1995
		CA 2117810 A	16-04-1995
		CN 2217400 U	17-01-1996
		KR 143303 Y	01-06-1999
		SG 52346 A	28-09-1998
		US 5607416 A	04-03-1997
EP 0925768 A	30-06-1999	JP 11188057 A	13-07-1999
		AU 9820298 A	15-07-1999
		BR 9806520 A	07-12-1999
		CN 1220865 A	30-06-1999
EP 0945111 A	29-09-1999	JP 11276520 A	12-10-1999
		AU 2135899 A	07-10-1999
		BR 9901713 A	28-12-1999
		CN 1230395 A	06-10-1999
EP 0321732 A	28-06-1989	DE 3741828 C	24-05-1989